



Institut für Versicherungswirtschaft

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Capital Allocation For Insurance Companies –

What Good Is It?

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Introduction

- Risk adjusted performance measurement (RAPM) and capital allocation has been widely discussed for several years

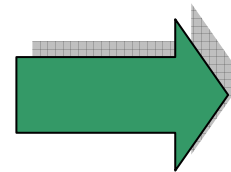
- Prominent RAPM measurers:

RAROC – risk adjusted return on capital

RORAC – return on risk adjusted capital

EVA – economic value added

- How does it work?



Introduction

- Capital is allocated to the firm as a whole and to business segments of the firm
- Cost of the (allocated) capital is compared with an earnings figure for the firm and the business segments
- From this comparison conclusions are drawn with respect to
 - ⇒ Risk management in business segments
 - ⇒ Performance evaluation of business segment management

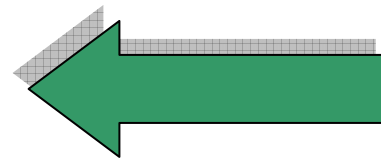
Introduction

⇒ Decisions on future business policy, e.g.,

- Restructuring lines of business
- Pricing insurance contracts

- However, the economic goal of allocating capital and performance measurement is – at least in some academic articles - not always clear

- Aim of this talk



Capital Allocation and Risk Adjusted Performance Measurement

- Capital allocation and RAPM concepts are linked to the shareholder value (SHV) approach

$$\text{EVA:} \quad G - EC \cdot r^{\text{hurdle}} > 0$$

$$\text{RORAC/RAROC:} \quad G / EC > r^{\text{hurdle}}$$

(Note that G / r^{hurdle} or EC may be risk adjusted)

- SHV-creation is measured at the company level and for the lines of business

Capital Allocation and Risk Adjusted Performance Measurement

Three steps:

1. Economic Equity Capital (EC) is calculated at the company level based on a given safety level (e.g., “AA“-Rating) using
 - Shortfall probability / value at risk approach (VAR)
 - Tail value at risk approach (TVAR)
 - Expected policyholder deficit (EPD)
 - ...

Capital Allocation and Risk Adjusted Performance Measurement

2. EC is allocated to the different lines of business; the cost of the allocated equity capital is compared with earnings figures for the lines of business

- There is an infinite number of possible allocation schemes
- Many articles begin by listing certain properties that an allocation methods should possess, e.g.,

Adding-up property, no undercut, symmetry, consistency ...

Capital Allocation and Risk Adjusted Performance Measurement

- Capital allocation methods:

Covariance based method (“beta”)

Variance method (allocating capital in proportion to variance)

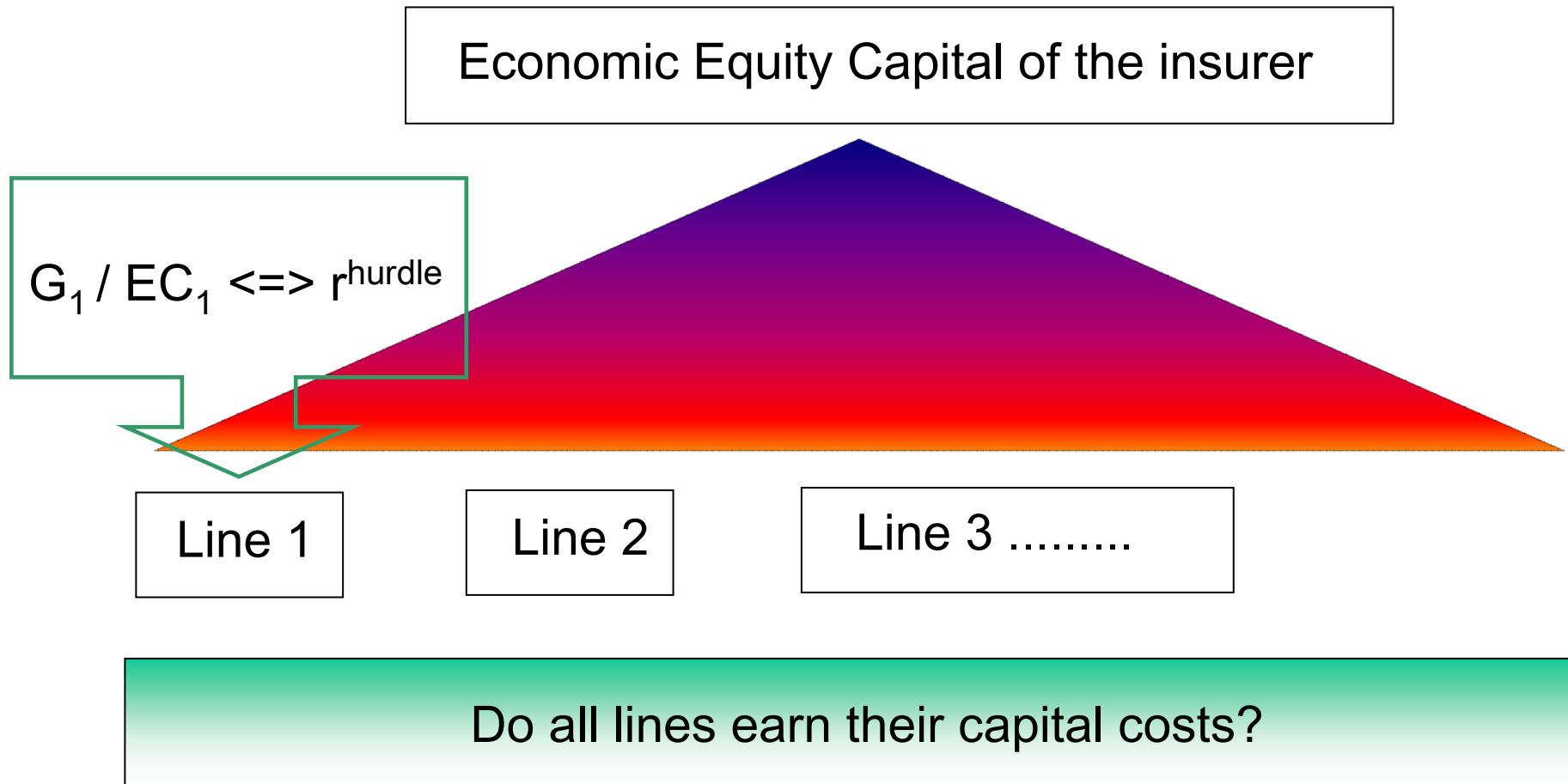
Value at risk method (allocating capital in proportion to the value at risk)

Tail value at risk method (allocating capital in proportion to the tail value at risk)

Myers and Read approach (allocation depends on the marginal contribution of a contract to the default value of the firm)

- 3.** From this comparison conclusions are drawn with respect to capital budgeting decisions, such as whether to expand or contract business segments

Capital Allocation and Risk Adjusted Performance Measurement



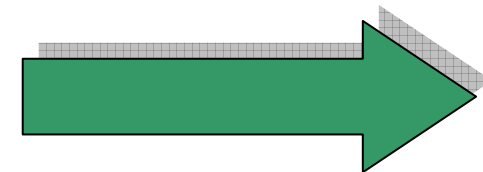
Possible Pitfalls

- Regarding point **1**:

The way of deriving EC plays a major role for RAPM

What happens to the difference between the equity capital (based on market values) and EC? Is it possible to receive a risk adjusted return on this fraction?

EVA / RAROC / RORAC are generally not consistent with the Net Present Value (NPV) approach



Possible Pitfalls

$$NPV = \frac{EC + E^Q(G)}{1 + r_f} - EC$$

$$E^Q(G) = E(G) - Riskadjustment$$

$$NPV = \frac{1}{1 + r_f} \cdot EC \cdot \left(\frac{E^Q(G)}{EC} - r_f \right)$$



Possible Pitfalls

- Differences to usual descriptions of RAROC:

Expected gain accruing from the risk-neutral distribution Q instead of gain observed over one (e.g., the last) period

“Hurdle rate” that RAROC must exceed is the riskless rate of return r_f (therefore, the hurdle rate is not a decision variable of the firm); deviation from r_f leads to problems of under- or overinvestment

Maximizing RAROC maximizes the NPV only, if EC is not a decision variable (a strong assumption!)

Possible Pitfalls

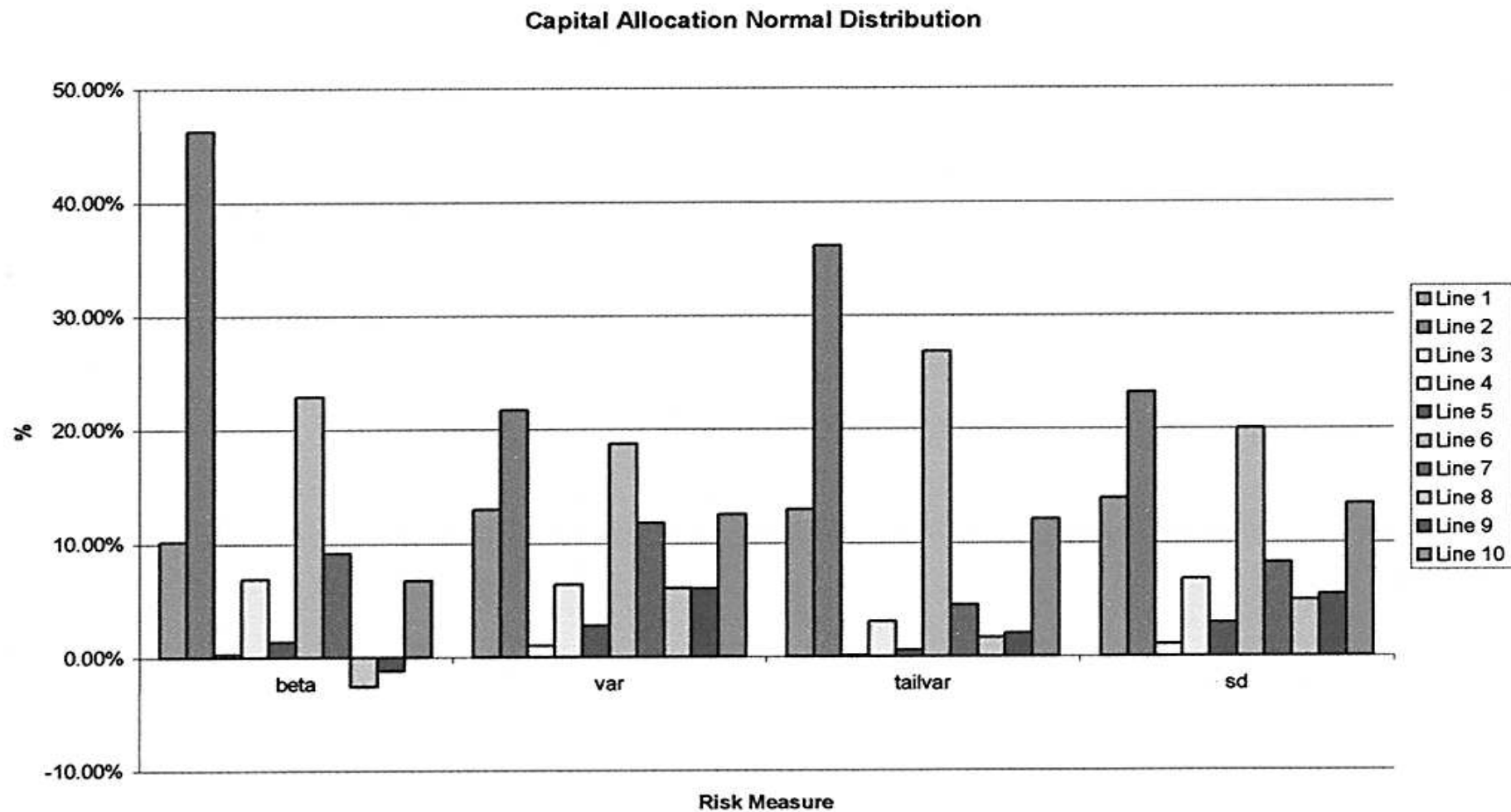
- Regarding Point **2**:

Different capital allocation methods lead to very different results (cf. Sherris, 2006, NAAJ)

Table 8
**Percentage Surplus Allocations for Different
Risk Measures—Panjer Data**

Line	Beta	VaR	TailVaR	SD
1	10.1%	13.0%	13.0%	13.9%
2	46.3	21.7	36.1	23.2
3	0.3	1.0	0.1	1.1
4	6.9	6.4	3.1	6.8
5	1.4	2.8	0.6	3.0
6	22.9	18.7	26.9	20.0
7	9.1	11.8	4.5	8.2
8	-2.6	6.1	1.6	4.9
9	-1.2	6.0	2.0	5.5
10	6.7	12.5	12.0	13.4
	100.0	100.0	100.0	100.0

Possible Pitfalls



Possible Pitfalls

Table 9

Percentage Surplus Allocations for Myers and Read s_i with Constant d_i for Varying Correlations between Liability Lines and Assets Based on Panjer Data

Line	-1	-0.4	-0.2	0	0.2	0.4	1
1	12.5%	11.0%	10.4%	9.7%	8.8%	7.7%	1.2%
2	26.5	29.8	31.2	32.8	34.7	37.0	51.5
3	0.8	0.6	0.5	0.3	0.2	0.0	-1.1
4	8.9	11.5	12.6	13.8	15.2	17.1	28.0
5	2.1	1.1	0.7	0.2	-0.3	-1.0	-5.3
6	18.0	15.5	14.4	13.3	11.8	10.1	-0.6
7	9.6	11.2	11.8	12.6	13.5	14.6	21.4
8	3.9	2.9	2.5	2.0	1.4	0.7	-3.8
9	4.4	3.2	2.7	2.2	1.5	0.7	-4.3
10	13.2	13.2	13.2	13.2	13.2	13.2	13.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Possible Pitfalls

- Is there one “right way” (and other wrong ways) to allocate capital?

Equity capital is the safety capital for the company as a whole

E.g., if insolvency occurs, it is because liabilities exceed assets of the entire company, not of a particular line

Hence, allocating capital costs ($EC \cdot r^{\text{hurdle}}$) leads to a common cost problem

Possible Pitfalls

- There is no non-arbitrary method to allocate common costs

This explains the variety of different capital allocation methods

- Certain capital allocation methods might fulfill specific properties; however, it is not clear how the fulfillment of certain properties are helpful in reaching the insurer's goals
- Different performance measures to evaluate business units use a variety of alternative definitions (e.g., concerning the hurdle rate or the risk adjustment)

Possible Pitfalls

Hence, a profitability ranking between different lines of business depends heavily on the particular RAPM used and on the applied capital allocation method

- Regarding Point **3**:

It is not possible to draw conclusions from a profitability ranking within a given risk and diversification context with respect to a “new firm”

E.g., cutting back on the (allegedly) most unprofitable line might, e.g., destroy a natural hedge

Possible Pitfalls

- On the other hand: How can a NPV-maximal business policy be determined (shareholder value approach)?

Definition of alternatives (expanding line / segment 1, etc.)

Main interrelations should be considered and modeled (correlations, cross-selling effects, joint distributions, demand for (re-)insurance depending on the firm's safety level, etc.)

Cash-flows resulting from the different alternatives need to be estimated; a certain NPV-model must be chosen

Possible Pitfalls

Best alternative / best strategy (measured by the NPV) can be taken

- A certain strategy will in general change the optimal equity capital (for the whole firm) and result in a new safety level
- In this context, capital allocation is not needed
- Same holds true (in this model framework!) for pricing insurance contract or allocating frictional costs (as is done in Myers and Read, JRI, 2001)



Outlook

- Capital allocation plays a big role in the insurance industry
- Clearly, different model settings should be applied in order to judge the scope of different capital allocation methods (further research is needed in this field)
- In insurance practice, capital allocation methods are / may be useful in mitigating problems of information asymmetry between top and line management

Thank you very much for your attention!

